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# Computerised objective evaluation of voice with trans and non-binary people

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## Abstract

Computerised evaluation of voice is a powerful tool for analysing aspects of voice including pitch, loudness, and screening for voice disorder. Trans and non-binary people may benefit from objective evaluation of voice prior to therapy, and the use of graphical visual feedback during therapy to achieve their authentic voice.

Many trans and gender diverse people choose to engage in voice and communication therapy (VCT) as part of their transition (LGBT Foundation, 2018). At the initial appointment, Service Users are screened for voice disorder. Subjective voice evaluation including the Grade Roughness Breathiness Asthenia Strain (GRBAS) rating scale may be used (Hirano, 1981). The presence, or suspected presence of a voice disorder calls for a referral to the Ear, Nose and Throat service (ENT) prior to commencing VCT, as therapy may place significant demands on the voice. Voice disorders may be pre-existing, or occur as a result of vocal changes attempted prior to seeking professional advice. The inclusion of a quick, non-invasive, and objective assessment for jitter and shimmer: cepstral analysis, has proved effective in identifying possible voice disorders (Heller Murray, 2022), complementing subjective measures. Routine computerised analysis, including cepstral peak prominence-smoothed (CPPS) analysis is an effective, objective screening tool for voice disorder in trans and gender diverse people seeking VCT.

Voice and communication therapy (VCT) is a form of speech and language therapy which involves exploring voice production as well as other aspects of communication, such as language usage and facial expression. Psychosocial aspects such as addressing stereotyping and societal expectations of voice are explored. Not all trans people opt to change their voice, and those service users who do are encouraged to explore authentic voice (Mills & Stoneham, 2021). This ensures an on-going exploration of voice and identity, with the speech and language therapist (SLT) and service user working in partnership. This approach provides clinical shared space for all service users, including non-binary people, and neurodivergent individuals who may use aspects of voice and communication (such as intonation and eye contact) in different ways to their neurotypical peers.

Voice recordings may be made and analysed objectively by SLTs using freely available software (Curtis, 2023). Praat (Boersma & Weenink, 2023) is a phonetics application which provides an almost instantaneous and accurate analysis of frequency and intensity. More recently, the value of CPPS analysis in identifying jitter and shimmer characteristic of voice disorder has been demonstrated (Heller et al., 2022; Murton et al., 2020; Saunder et al., 2017). Plug-ins for Praat allow clinicians to carry out CPPS calculations at the click of a button (Heller Murray, 2022), and compare with threshold data (Murton et al., 2020) to identify voice disorder.

Routine use of CPPS has enhanced referrals to ENT and Voice Disorder specialists. In addition, Praat provides graphs of frequency range, intonation patterns, and loudness which act as models and visual feedback for service users undertaking VCT. Pitch manipulation of

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the service user's speech recordings can even provide a model of the target vocal range. Service users reported better understanding and control of pitch, intonation and loudness when using these feedback methods than from commentary alone. Although not always suitable for home practice, the use of Praat to demonstrate vocal techniques can encourage service users to adopt apps on mobile devices and have more confidence in their understanding of vocal goals.

### Outcomes

To understand the use of computerised evaluation of voice, including frequency (pitch and intonation), and sound pressure level (loudness) using free software.

To understand rapid screening for voice disorder using CPPS thresholds.

To understand the use of visual feedback using Praat and plug-ins to demonstrate and practice relevant aspects of voice including frequency range (pitch), frequency variation across utterances (intonation) and sound pressure level (loudness and projection).

### Key words

Computerised voice evaluation

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